

Remarks

This amendment responds to the official action of September 12, 2008, wherein certain objections were made and the claims were rejected as anticipated by US 2002/0173169 – Campana or US 2002/0040994 - Nitta.

The claims have been amended to more particularly and distinctly define the subject matter of the invention and better to distinguish over the prior art. The differences between the invention and the prior art are such that the subject matter claimed as a whole is not disclosed by the cited prior art. Nor would the invention claimed as a whole be obvious to a person of ordinary skill.

An objection was made regarding claims 2 and 6 and the drawings, under 37 C.F.R. §1.83. Claims 2 and 6 have been cancelled to obviate the grounds of rejection.

An objection was made regarding the citation of certain references in the specification. In order that such references be considered of record, applicant submits an Information Disclosure Statement (IDS) form PTO/SB08 and the required fee for filing an IDS after a first official action on the merits. The IDS cites and submits the documents cited in the specification (and/or English language counterparts).

Applicant has generally amended the claims to more particularly and distinctly define the subject matter regarded as the invention. Claim 4 is cancelled together with claims 2 and 6 as mentioned above. The claims as amended are definite. No new matter is presented.

Claims 1, 4-5 and 9-13 were rejected as anticipated by Campana. The pending claims comprise two independent claims 1 and 5, which are method claims, and independent claim 13 for the product. Reconsideration is requested with respect to the rejection over Campana. Campana discloses a general filling procedure, but does not disclose a trench filling method or a resulting product from such a method, wherein a

trench is laterally sealed inwardly over a void, extending in a longitudinal direction, as defined in applicant's claims as a whole.

Refilling processes for isolation trenches are known from various publications including references cited by the Examiner and also in references cited by applicant concurrently with this response. However the invention claimed also requires sealing laterally across a trench so as to form a longitudinal end of a void that is hermetically sealed.

In the illustrated embodiments (see Fig. 1, which is a top-down or plan view), the trench has a narrower width part 1 that joins to a wider width part 2 via a tapered or "conical" transition 3. As shown in Fig. 1, there are conical and narrow segments on opposite ends of the wider width part 2. Referring further to applicant's Fig. 4e, which shows a cross section at line E-E in Fig. 4, deposition that narrows the trench laterally inwardly from the sides causes the trench to become laterally closed. This occurs first in the narrower part, and as a result, a longitudinal closure of the void in the wider part occurs at a point along the conical section between wider and narrower parts. In Fig. 3, section C-C show the cross section at a longitudinal point where closing is occurring, leading to the state shown in Fig. 4e. Due to this configuration, lateral filling of the trench, as claimed, produces voids that are bounded at longitudinal points as well as over the void at the top or mouth of the trench.

So long as trench is accessible (open at the top), the trench may be filled by depositing material on the side walls. The filling material adheres to the side walls down to the bottom of the trench, as shown in Fig. 2, progressively building up deposition thickness. However, the trench width varies along the longitudinal length of the trench, and there is a range of widths between the ends of the tapered transitions, between the wider and narrower parts of the trench. As a result, the lateral width of the void (Section B-B) progressively narrows along the transitions. The claims define the aspect of a longitudinal point along the tapered or conical transition portions, where the normal width b_1 of each trench is reached. At this longitudinal point, the trench is thereby occluded by laterally inward filling of the trench. Fig. 4 and Section D-D are at the

longitudinal point at which the trench is just closed (shown as a vertical line). At this point, the longitudinal end of the void is closed, the void having a lateral width and a longitudinal length proceeding away from Section D-D in the wider part of the trench.

The void has been hermetically sealed because longitudinal ends isolating the void in the trench are closed by deposition that closes the width of the trench at the tapered conical sections. In Fig. 2, it is seen that the upper part of the trench can be closed over the void at the wide part of the trench, by low pressure deposition. As further explained at page 6, second through fourth paragraphs of the English translation (paragraphs [0019] to [0021] as published), subsequent gas exchange is prevented when the voids are sealed over. Applicant's technique provides voids at the broader portion of the trench, which voids are hermetically sealed. The wider-spacing of the side walls results in the trench remaining open for longer time during deposition, producing a longitudinally bounded void that is subsequently bridged over and sealed shut.

The independent claims recite that the trench has broad and narrow portions. It is possible for an individual trench to have a number of alternately broad and narrow portions, and it is possible to provide a number of trenches that are thus configured. However the claims require a trench with adjacent broad and narrow portions, leading to the lateral closing of the trench at a longitudinal point that isolates a void as described. This aspect is defined in each of the independent claims and is not disclosed or suggested by the prior art of record.

Claim 1 particularly defines that each trench has a first width and is slightly broadened at a specific trench portion. An upper trench portion is closed with a fill material. Each trench is hermetically sealed by material deposition, that can naturally closes the narrower part of the trench before the wider part, thereby producing a seal in the longitudinal direction.

Neither of the Campana and Nitta prior art references, cited as anticipations, discloses or remotely suggests a comparable structure wherein a void in a trench is

hermetically isolated by virtue of deposition accompanied by variation in the width of the trench. Therefore, the rejections should be withdrawn in view of this amendment.

The Campana reference has a V-shaped trench in cross section but no difference in lateral width along the trench. Campana does not teach or suggest a trench with a wider part and a narrower part arranged such that a longitudinal closure is achieved by a lateral deposition buildup that closes the narrower part of the trench before the wide part. Campana '169 fails to disclose or suggest a trench that has a portion with a smaller width and a portion with a wider width.

In the official action, the examiner has suggested that the trench disclosed by Campana and shown by Campana's Fig. 4A has a broader portion and a narrower portion. Actually, the bottom of the Campana trench is laterally narrower and than the width of the trench at the surface. Such a reading of Campana does not meet the claims as amended. Claims 1, 5 and 13 state that the respective wider and narrower portions of the trench are longitudinally adjacent to one another or between one another, thereby distinguishing from Campana on ground of novelty.

Furthermore, there is nothing in Campana that even remotely suggests that the trench has any variation in width whatsoever from one longitudinal point to another. If the person of ordinary skill considered the possibility of narrowing Campana's trench, common sense would suggest that the deposition of material would be adversely affected or at least a fundamentally different result would be achieved that would defeat the formation of voids 68.

Assuming that the person of ordinary skill considered progressive deposition of material so as to build up thickness on the lateral sides of the trench, the result would fill the V-shaped Campana trench from the bottom but would not close off a void at any longitudinal point. Such a situation would not meet the invention claimed as a whole, and presumably would defeat Campana's objection of forming a void 68 (namely a void that is not bounded at any longitudinal point).

There is no basis to suggest that the person of ordinary skill would perceive a beneficial result from varying the width of a trench with parallel walls, from one point to another along the length of the trench. There is certainly no way for one to reach such a conclusion from Campana. Campana and also Nitta were both so blind to the possibility of alternately wider and narrower portions (or any other longitudinal variations) that there is not even a single top-down plan view included in any of their drawings. Like many drawings concerning deposition methods, only cross sections were deemed necessary to illustrate the subject matter.

The lack of any teaching or illustration of a top-down plan view is telling. The knowledge and common sense of the person of ordinary skill do not immediately include consideration of an orthogonal dimension when considering the progress of deposition on a trench, i.e., when viewing the cross section of a trench. There is certainly no basis to assert that the invention claimed as a whole by applicant was disclosed to the person of ordinary skill by Campana, and likewise, no basis has been provided to explain how the invention would have been made obvious from Campana, even together with the exercise of common sense.

The Nitta reference likewise fails to disclose the claimed method. US 2002/0040994 – Nitta is much the same as Campana, except that the trenches are rounded at the bottom and have substantially parallel sidewalls oriented perpendicular to the surface plane, as opposed to the truncated taper in the cross section of the trench in Campana. Nitta also forms a void, but there is no change in the width of the trench disclosed or suggested for any longitudinal point compared to another. There is no disclosure of a plan view at all, all the views being cross sections. The person of ordinary skill has only to believe that the trenches in Nitta, like Campana are of constant shape (the same width configuration) at every point along their lengths.

As a result, there is no basis to conclude that the voids of Campana and Nitta might be or should be hermetically sealed at longitudinally placed occlusions. There is no basis to conclude that such occlusions might be formed by progressive deposition, considering that the trench has different lateral widths at different points along a

longitudinal axis. Such a structure produces a lateral constriction resulting in a longitudinal closure according to the methods and structures defined in applicant's claims. A similar technique is not found or suggested in Nitta and/or Campana. There is no basis short of improper hindsight to infer that the configurations disclosed in the references might be altered in the manner claimed. The additional prior art references cited in the accompanying disclosure are consistent. There is no disclosure of the invention claimed as a whole.

In order to maintain a proper rejection under 35 U.S.C. §102, it is not sufficient for the Examiner to turn a cross sectional view into a longitudinal length of trench and to read the claims on disclosures that lack the aspect of a hermetically sealed void. To anticipate a claim under 35 U.S.C. §102, a single prior art reference must expressly or inherently disclose each limitation claimed. The prior art of record fails to do so. Furthermore, alleged disclosure of each element is not enough to maintain a rejection for lack of novelty under Section 102. Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention, and those elements must be arranged as stated in the claim. See, *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). The point is that a rejection under Section 102 must be based on a disclosure of the same invention as claimed. A rejection based on a disclosure of something other than the claimed invention is insufficient and improper, regardless of how cleverly the subject matter may be reinterpreted to make it appear to include the elements of the claim.

The present rejection is not properly made. The rejection is based on picking, choosing and combining alleged elements of the prior that do not meet or are not arranged as stated in applicant's claims. The rejection requires a dubious and literally erroneous interpretation of terminology that is well understood, such as "longitudinal" and "lateral" orientation, and the concept of width, as each of these terms is understood to apply to a trench. For these reasons and also due to clarifying amendments made herein, consistent with the subject matter of the disclosure as filed, applicant requests that the rejection on grounds of anticipation be withdrawn.

The hermetic sealing of the voids as claimed is more than a consequential aspect. By providing hermetically sealed voids (including the closure of longitudinal points along a trench), gas cannot be transported along the trench. This can be important, for example in the case of crossing a cap sealing stripe by such a trench with a void. In such a case, the leakage rate between a sealed cavity and the outside can be improved by this type of sealing of voids in the trenches.

Applicant has provided an innovation in configuring a trench with different widths and applying deposition sufficient to pinch off the narrow widths at a longitudinally placed closure, in a manner that is not disclosed by the prior art and is not shown to have been obvious.

Applicant has made every effort to overcome the matters to which the Examiner objected, to particularly and distinctly define the subject matter of the invention, and to point out distinctions that are not met by the prior art. There is no basis to conclude that the invention as claimed is met by Campana or Nitta. The differences between the invention and the prior art, giving due consideration for common sense and the versatility of the person of ordinary skill, are such that the subject matter claimed as a whole is not shown to have been known or obvious.

Applicant therefore requests allowance of pending claims 1, 3, 5 and 7-13.

Respectfully submitted,

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